K-5 Fraction Learning Progression:
Representing, Comparing and Operating with Fractions

Essential Understandings with Related Virginia Mathematics Standards

- The whole must be defined. (3.3)
- Fractional parts are equal shares of a whole region or a whole set.(K.5)(1.3)(2.3)
- The fraction name (i.e., *half, third, fourth)* tells the number of equal parts in the whole. (K.5)(1.3)(2.3)
- Understand fractions as parts of unit wholes, as parts of a collection, and as locations on a number line. (4.2)
- When working with unit fractions, the larger the denominator the smaller the part and therefore the smaller the fraction. (2.3)
- The more parts the whole is divided into, the smaller the parts. (4.2)
- The denominator tells the number of equal parts that represent a whole.   The numerator is a counting number that tells how many equal size parts are being considered. (3.3)
- The value of a fraction is dependent on both the number of parts in a whole (denominator) and the number of those parts being considered (numerator). (3.3)
- A proper fraction is a fraction whose numerator is smaller than its denominator. (3.3)
- An improper fraction is a fraction whose numerator is greater than or equal to the denominator and is one or greater than one. (3.3)

- An improper fraction can be expressed as a whole number or a mixed number. (3.3)
- A mixed number is a fraction that has two parts: a whole number and a proper fraction. The mixed number is the sum of these two parts.(3.3)(4.2)
- Models, benchmarks, and equivalent forms can be used to judge the size of fractions. (4.2)
- Recognize and generate equivalent forms of commonly used fractions. (4.2)
- Understand the division statement that represents a fraction.(4.2)
- Use visual models to add and subtract with fractions.(4.5)
- Understand and use common multiples and common factors for simplifying fractions. (4.5)
- A fraction is in simplest form when its numerator and denominator have no common factors other than 1. The numerator can be greater than the denominator. (5.6)
- Least common multiples and least common denominators are helpful when adding and subtracting fractions. (5.6)
- Multiple strategies can be used to estimate and compute addition and subtraction involving fractions. (4.5)(5.6)

MAKE MEANING OF FRACTIONS (including identifying, naming, and representing)

VA SOL	K.5 Identify the parts of a set and/ or region that represent fractions for halves and fourths	1.1 Identify the parts of a set and/or region that represent fractions for halves, thirds, and fourths and write the fractions.	2.3 a) Identify the parts of a set and/or region that represent fractions for halves, thirds, fourths, sixths, eighths, and tenths; b) Write the fractions	3.3 a) Name and write fractions (including mixed numbers) represented by a model; 3.3b) Model fractions (including mixed numbers) and write the fraction name.
Essential Knowledge and Skills	• Recognize fractions as representing parts of equal size of a whole. • Given a region, identify half and/or a fourth of the region. • Given a set, identify half and/or a fourth of the set.	• Represent a whole to show it having two equal parts and identify one-half ($\frac{1}{2}$), and two halves ($\frac{2}{2}$). • Represent a whole to show it having three equal parts and identify one-third ($\frac{1}{3}$), two-thirds ($\frac{2}{3}$) and three-thirds ($\frac{3}{3}$). • Represent a whole to show it having four equal parts and identify one-fourth ($\frac{1}{4}$), two-fourths ($\frac{2}{4}$), three-fourths ($\frac{3}{4}$) and four-fourths ($\frac{4}{4}$). • Identify and model halves, thirds, and fourths of a whole, using the set model (e.g., connecting cubes and counters), and region/ area models (e.g., pie pieces, pattern blocks, geoboards, paper folding, and drawings). • Name and write fractions represented by drawings or concrete materials for halves, thirds, and fourths. • Represent a given fraction using concrete materials, pictures, and symbols for halves, thirds, and fourths. (For example, write the symbol for one-fourth, and represent it with concrete materials and pictures.)	• Recognize fractions as representing equal-size parts of a whole. • Identify the fractional parts of a whole or a set for $\frac{2}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{2}{6}$, $\frac{7}{8}$, $\frac{7}{10}$, etc. • Identify the fraction names (halves, thirds, fourths, sixths, eighths, tenths) for the fraction notations $\frac{2}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{2}{6}$, $\frac{7}{8}$, $\frac{7}{10}$, etc. • Represent fractional parts of a whole for halves, thirds, fourths, sixths, eighths, tenths using: - *region/area models* (e.g., pie pieces, pattern blocks, geoboards); - *set models* (e.g., chips, counters, cubes); and - *measurement models* (e.g., fraction strips, rods, connecting cubes).	• Name and write fractions (including mixed numbers) represented by a model to include halves, thirds, fourths, eighths, tenths, and twelfths. • Use concrete materials and pictures to model at least halves, thirds, fourths, eighths, tenths, and twelfths.

COMPARE AND REPRESENT EQUIVALENT FRACTIONS

VA SOL	2.3c) Compare the unit fractions for halves, thirds, fourths, sixths, eighths, and tenths.	3.3c) Compare fractions having like and unlike denominators, using words and symbols (>, <, or =).	4.2 a) Compare and order fractions and mixed numbers.	4.2b) Represent equivalent fractions.
Essential Knowledge and Skills	• Compare unit fractions ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, and $\frac{1}{10}$) using the words greater than, less than or equal to, and the symbols (>, <, =). • Comparing unit fractions (a fraction in which the numerator is one) builds a mental image of fractions and the understanding that as the number of pieces of a whole increases, the size of one single piece decreases (e.g., $\frac{1}{6}$ of a bar is smaller than $\frac{1}{4}$ of a bar).	• Compare fractions using the terms greater than, less than, or equal to and the symbols (<, >, and =). Comparisons are made between fractions with both like and unlike denominators, using models, concrete materials and pictures. • Comparing fractions to a benchmark on a number line (e.g., close to 0, less than $\frac{1}{2}$, exactly $\frac{1}{2}$, greater than $\frac{1}{2}$, or close to 1) facilitates the comparison of fractions when using concrete materials or pictorial models.	• Compare and order fractions having denominators of 12 or less, using manipulative models and drawings, such as region/area models. • Compare and order fractions with like denominators by comparing number of parts (numerators) (e.g., $\frac{1}{5} < \frac{3}{5}$). • Compare and order fractions with like numerators and unlike denominators by comparing the size of the parts (e.g., $\frac{3}{9} < \frac{3}{5}$). • Compare and order fractions having unlike denominators of 12 or less by comparing the fractions to benchmarks (e.g., 0, $\frac{1}{2}$ or 1) to determine their relationships to the benchmarks or by finding a common denominator. • Compare and order mixed numbers having denominators of 12 or less. • Use the symbols >, <, and = to compare the numerical value of fractions and mixed numbers having denominators of 12 or less.	• Represent equivalent fractions through twelfths, using region/ area models, set models, and measurement models. • A variety of fraction models should be used to expand students' understanding of fractions and mixed numbers: - Region/area models: a surface or area is subdivided into smaller equal parts, and each part is compared with the whole (e.g., fraction circles, pattern blocks, geoboards, grid paper, color tiles). - Set models: the whole is understood to be a set of objects, and subsets of the whole make up fractional parts (e.g., counters, chips). - Measurement models: similar to area models but lengths instead of areas are compared (e.g., fraction strips, rods, cubes, number lines, rulers).

OPERATE WITH FRACTIONS

	3.7 Add and subtract proper fractions having like denominators of 12 or less.	4.2c) Identify the division statement that represents a fraction.	4.5 a) Determine common multiples and factors, including least common multiple and greatest common factor.	4.5 b) Add and subtract fractions having like and unlike denominators that are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fractions, using common multiples and factors.	5.6 Solve single-step and multistep practical problems involving addition and subtraction with fractions and mixed numbers and express answers in simplest form.
VA SOL					
Essential Knowledge and Skills	• Add and subtract with proper fractions having denominators of 12 or less, using concrete materials and pictorial models representing area/ regions (circles, squares, and rectangles), length/ measurements (fraction bars and strips), and sets (counters).	• Identify the division statement that represents a fraction (e.g., $\frac{3}{5}$ means the same as 3 divided by 5).	• Find common multiples and common factors of numbers. • Determine the least common multiple and greatest common factor of numbers. • Use least common multiple and/or greatest common factor to find a common denominator for fractions.	• Add and subtract with fractions having like denominators whose denominators are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction using common multiples and factors. • Add and subtract with fractions having unlike denominators whose denominators are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction using common multiples and factors. • Solve problems that involve adding and subtracting with fractions having like and unlike denominators whose denominators are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction using common multiples and factors. • Solve single-step and multistep problems that involve adding and subtracting with fractions.	• Solve single-step and multistep practical problems involving addition and subtraction with fractions having like and unlike denominators. Denominators in the problems should be limited to 12 or less (e.g., $\frac{1}{5} + \frac{1}{4}$) and answers should be expressed in simplest form. • Solve single-step and multistep practical problems involving addition and subtraction with mixed numbers having like and unlike denominators, with and without regrouping. Denominators in the problems should be limited to 12 or less, and answers should be expressed in simplest form. • Use estimation to check the reasonableness of a sum or difference.

Note: This learning progression does not include standards of learning associated with connecting fractions to decimals. These concepts are included in the VDOE Fraction and Decimal Learning Progression for Grades 4-8.